

1           **INFORMATION EXTRACTION SYSTEM, INFORMATION PROCESSING**  
2           **APPARATUS, INFORMATION COLLECTION APPARATUS, CHARACTER STRING**  
3           **EXTRACTION METHOD, AND STORAGE MEDIUM**

4   Field of the Invention

5   The present invention relates to an information processing  
6   method for monitoring the manipulation by a user of data on the  
7   screen of a computer display device, and for obtaining other  
8   related information.

9   Background Art

10   Because the commercial use of the Internet, such as for on-line  
11   shopping or for the dissemination of advertising material using  
12   banner ads, has become so popular, there is great interest in  
13   improving and maximizing the effects produced by this Internet  
14   application. Web site managers perform research to obtain the  
15   reactions of users (web audience ratings) to web page content,  
16   and the results provided by the research are reflected in the  
17   subject matter published on web pages or in the design of web  
18   sites, or are used for One-to-One marketing.

19   In order to obtain information concerning the web site subjects  
20   or themes users are most attracted to, conventional web  
21   audience rating research methods include the provision of  
22   questionnaires that site visitors are requested to complete,  
23   and means for garnering browser access information, including  
24   page display time and the number of page visits, that is

1 subsequently used to prepare estimated user reaction profiles.  
2 The access information referred to here is the number of HTTP  
3 access requests (the number of hits) received by a server, and  
4 other information concerning the browsing of specific web  
5 contents that are acquired by a client.

6 According to the web audience rating method according to which  
7 users are requested to complete questionnaires, the research is  
8 conducted by asking the users for informative entries.  
9 Specifically, a questionnaire page, for example, is prepared in  
10 advance for inclusion in web contents, so that users can select  
11 interesting topics and keywords. Either this, or distributed  
12 across web pages are buttons labeled "Interesting" or "Boring"  
13 that viewers are invited to select and click on. According to  
14 this method, since the information is obtained as a result of  
15 informative input operations performed by users, the obtained  
16 information can be used to very reliably track user interest  
17 trends.

18 As one type of information that can be obtained by a server for  
19 use in web audience rating research, the count of HTTP access  
20 requests (the number of hits) issued for web page contents is  
21 heavily relied on. When a web page is available and can be  
22 read using a web browser, and when an image is embedded in a  
23 web page or framing is employed, the number of hits received  
24 for the specific page is counted. In this case, a web server  
25 does not accept an HTTP access request when it is moving from  
26 one set of web page contents to another.

27 According to this method, all the content (resource) accesses  
28 initiated by a user can be recorded. And when this data is  
29 combined with information concerning the resource type (HTML

1 files, images, etc.) involved, the length of time the user  
2 spent viewing the predetermined web contents can be estimated.

3 Since a client can monitor the state of a window that is  
4 displayed by a web browser, a client is able to obtain more  
5 detailed information than is a server. For example, a client  
6 can measure the display time for each page, and for windows can  
7 record and examine all changes in location and all sizes and  
8 resolutions used for focusing, while at the same time recording  
9 keywords selected by a user's manipulation of a data entry  
10 device. Additionally, the browsing history of a user can be  
11 recorded, without it being limited to a specific web site.  
12 Based on the information obtained by employing such a method,  
13 user interest trends can, to a degree, be estimated.

14 In addition, available for use for research are the search  
15 engines that users employ to obtain desired information. When  
16 using a search engine, a user enters a keyword and clicks on a  
17 start button or presses enter, and the search engine then scans  
18 a number of web pages for the keyword. Subsequently, if web  
19 pages containing the keyword are found, the search engine  
20 displays them in a listing. For this process, however, because  
21 of the huge number of web pages that are available, it is  
22 important that some restriction be applied that can  
23 appropriately reduce the number of pages scanned. As a  
24 technique for accomplishing this, of the pages listed as a  
25 result of one search a user selects a new keyword from a page  
26 that best matches his or her interest, and uses the new keyword  
27 to initiate another search. In this case, by using a keyword  
28 extracted from a document that the user selected as the one  
29 that most nearly matched the purpose of the search, the search  
30 conditions are automatically changed. Thus, the trend

1 corresponding to of the user's interest will be reflected in  
2 the search results. In this case, a keyword that is employed  
3 is one that is representative of the entire page that is  
4 selected.

#### 5 Problems Solved by the Invention

6 However, when information concerning user interests, such as  
7 the subject and the theme to which a user's attention is drawn,  
8 is acquired by using a conventional web audience rating search  
9 or by using a conventional search engine, the amount and  
10 reliability of the data obtained are not satisfactory. Since  
11 when employing the method according to which users are  
12 requested to complete questionnaires, the work involved in  
13 filling out the questionnaires is imposed on the users, a high  
14 response rate can not be obtained. Similarly, while taking  
15 into consideration the load that is to be imposed on users, it  
16 is difficult to issue a complicated questionnaire in which an  
17 evaluation is requested for each item, such as each sentence,  
18 appearing on a page. Further, to request the questionnaire,  
19 pages and buttons for the questionnaire must be prepared, so  
20 that obtaining information concerning arbitrary web contents is  
21 not an easy task.

22 According to the method for estimating the audience rate by  
23 using the information acquired by the server machine or the  
24 client machine, the information obtained by the server consists  
25 simply the number of hits web contents receive, as described  
26 above. From this, the time a user spent viewing predetermined  
27 web contents can be estimated, but detailed information, such  
28 as which web page the user read and the time the user spent  
29 reading it, can not be obtained for each web page.

1 These data could be acquired, however, were a client machine  
2 capable of monitoring the state of a window that is displayed  
3 by a web browser. But since means for monitoring a web browser  
4 would have to be mounted on a client machine as an application  
5 program or as a proxy server, and since control of the  
6 monitoring operation would have to be exercised from outside  
7 the web browser, the data structure of a web page can not be  
8 accessed. As a result, the manipulation of an object in an  
9 HTML document by a mouse can not be recorded, and thus,  
10 detailed information, such as which portion of a web page a  
11 user is particularly interested in, can not be acquired.

12 A method for accessing information acquired and presented by a  
13 web browser can be one for which a Java applet is used for  
14 mounting the web contents. However, since with this method  
15 only the contents of the Java applet could be obtained, it is  
16 not appropriate for application for a common web page.

17 Further, as is described above, according to the method for  
18 changing the search conditions for the operation of a search  
19 engine based on an evaluation that is made of a user, a keyword  
20 used for this purpose is extracted from a document that  
21 constitutes a target web page. Thus, a portion (a sentence or  
22 a word) that the user pays particular attention to in the  
23 document can not accurately be reflected, in detail, by the  
24 search condition.

## 25 Summary of the Invention

26 To resolve the above technical shortcomings, it is one object

1 of the present invention to eliminate the need for clear input  
2 by users, and to permit users to obtain detailed information  
3 concerning those portions of web contents in which they are  
4 most interested.

5 Further, it is another object of the present invention to  
6 extract detailed information concerning operations performed by  
7 users, including operations involving the use of web browsers,  
8 so that this information will be available and can be used when  
9 user interest trends are being plotted. These and other  
10 objects of the present invention are achieved as subsequently  
11 described.

12 Brief Description of the Drawings:

13 These and other aspects, features, and advantages of the present  
14 invention will become apparent upon further consideration of the  
15 following detailed description of the invention when read in  
16 conjunction with the drawing figures, in which:

17 Fig. 1 is a diagram for explaining the overall arrangement of  
18 an information extraction system according to an example  
19 embodiment of the present invention;

20 Fig. 2 is a conceptual diagram for explaining the functions of  
21 an operating event detector 10, an operating event analyzer 20  
22 and a text extractor 30 according to the embodiment;

23 Fig. 3 is a diagram for explaining a program required when  
24 dynamic HTML is employed to carry out the text extraction  
25 process of the text extractor 30 when text selection is

1 performed;

2 Fig. 4 is a diagram for explaining the text extraction process  
3 when text selection is performed;

4 Fig. 5 is a diagram for explaining a program required when  
5 dynamic HTML is employed to carry out the text extraction  
6 process of the text extractor 30 when pointing to a link is  
7 performed;

8 Fig. 6 is a diagram for explaining the text extraction process  
9 when the pointing to the link is performed;

10 Fig. 7 is a diagram for explaining the process for identifying  
11 the line immediately above the line the mouse pointer overlaps  
12 during a tracing and reading operation;

13 Fig. 8 is a diagram for explaining the text extraction process  
14 when a tracing and reading operation is performed;

15 Fig. 9 is a diagram for explaining a mode for providing an  
16 information extraction system according to the present  
17 invention;

18 Fig. 10 is a diagram for explaining another mode for providing  
19 an information extraction system according to the present  
20 invention;

21 Fig. 11 is a diagram for explaining an additional mode for  
22 providing an information extraction system according to the  
23 present invention;

1 Fig. 12 is a diagram for explaining one further mode for  
2 providing an information extraction system according to the  
3 present invention; and

4 Fig. 13 is a diagram showing a comparison between the example  
5 embodiment of the present invention and the prior art when the  
6 text extracted in this embodiment is employed to generate a  
7 keyword vector for a search engine.

#### 8 Description of the Invention

9 To achieve the above objects, according to the present  
10 invention, an information extraction system comprises a server  
11 and a client, connected via a communication network, wherein  
12 the server provides a data file for a client to browse; and  
13 wherein the client includes browsing means for displaying the  
14 contents of the data file that is received from the server via  
15 the communication network, operation detection means for  
16 detecting a predetermined specific operation based on a user's  
17 operation when the user reads the contents of the data file  
18 displayed by the browsing means, and means for extracting  
19 information that is displayed at a location whereat the  
20 specific operation that is detected by the operation detection  
21 means is performed on a display screen of the browsing means.

22 According to the present invention, an information extraction  
23 system comprises: a web server for storing web contents; and a  
24 client for receiving the web contents from the web server, via  
25 a communication network, and for displaying the web contents,  
26 the client including an operating event detection function for  
27 detecting, as a manipulation event, an operation performed by a



1 user on a display screen of the web contents, wherein a program  
2 package, which is written in a function expansion program  
3 language for expanding the functions available to the client,  
4 is embedded in the web contents stored in the web server, the  
5 program package permitting the client to perform a process for  
6 employing the operating event detection function of a client to  
7 detect an operating event, a process for analyzing a string of  
8 operating events that are detected to extract a predetermined,  
9 specific operation, and a process for extracting from the web  
10 contents target information for the specific operation, and for  
11 returning the target information to the web server. This  
12 arrangement is superior because when an information processing  
13 apparatus accesses the web contents in which a web contents  
14 creator has embedded a program package, the information  
15 processing apparatus can obtain information concerning the  
16 contents that a user is interested in. The obtained  
17 information can then be employed for services, such as research  
18 performed to ascertain web audience rates and a reduction in  
19 the search conditions for a search engine.

20 Furthermore, according to the present invention, an information  
21 extraction system comprises: a web server, for storing web  
22 contents; and a client, for receiving the web contents from the  
23 web server, via a communication network, and for displaying the  
24 web contents, wherein the client includes an operating event  
25 detection function for detecting, as a manipulation event, an  
26 operation performed by a user on a display screen of the web  
27 contents, wherein the web server embeds, in the web contents, a  
28 program package, which is written in a function expansion  
29 program language, that expands the functions available to the  
30 client and that permits the client to perform a process for  
31 employing the operating event detection function belonging to

1 the client to detect an operating event, a process for  
2 analyzing a string of operating events that are detected to  
3 extract a predetermined specific operation and a process for  
4 extracting target information for the specific operation from  
5 the web contents and for returning the target information to  
6 the web server, and wherein the web server transmits the  
7 program package to the client. This arrangement is superior  
8 because the web server can obtain information concerning which  
9 of the stored web contents the user is interested in. The  
10 obtained information can then be employed for services, such as  
11 research performed to ascertain web audience rates and a  
12 reduction in the search conditions for a search engine.

13 Further, according to the present invention, an information  
14 extraction system comprises: a web server, for storing web  
15 contents; a proxy server, for receiving web contents from the  
16 web server via a communication network and for performing an  
17 additional process; and a client, for displaying the web  
18 contents for which the proxy server has performed the  
19 additional process, wherein the client includes an operating  
20 event detection function for detecting, as a manipulation  
21 event, an operation performed by a user on a display screen of  
22 the web contents, wherein the proxy server embeds, in the web  
23 contents received from the web server, a program package, which  
24 is written in a function expansion program language, for  
25 expanding the functions available to the client, and that  
26 permits the client to perform a process for employing the  
27 operating event detection function belonging to the client to  
28 detect an operating event, a process for analyzing a string of  
29 operating events that are detected to extract a predetermined  
30 specific operation and a process for extracting target  
31 information for the specific operation from the web contents,

1 and for returning the target information to the proxy server,  
2 and wherein the proxy server transmits the program package to  
3 the client. This arrangement is superior because the proxy  
4 server can obtain information concerning which of the stored  
5 web contents the user is interested in. The obtained  
6 information can then be employed for services, such as research  
7 performed to ascertain web audience rates and a reduction in  
8 the search conditions for a search engine.

9 Instead of transmitting the program package to the client, the  
10 proxy server may include: operating event acquisition means,  
11 for collecting operating events that are detected by the  
12 client; operating event analyzation means, for analyzing a  
13 string of the operating events that are received from the  
14 client and for extracting a predetermined specific operation;  
15 and information extraction means, for extracting, from the web  
16 contents, target information for the predetermined specific  
17 operation. This arrangement is preferable because, based on  
18 the operating event, a proxy server can extract information  
19 concerning specific operations, and information concerning data  
20 that users are interested in, so that the load imposed on  
21 clients can be reduced. The web contents from which a proxy  
22 server extracts information may be those that the proxy server  
23 receives, from a web server, and stores, or may be those that  
24 are requested from a client when the information is to be  
25 extracted.

26 Moreover, according to the present invention, an information  
27 extraction system comprises: a web site, for storing web  
28 contents; an information processing apparatus that includes a  
29 web browser, for receiving the web contents from the web  
30 server, via a communication network, and for displaying the web

1 contents; and a portal site, for the information processing  
2 apparatus, wherein the portal site, upon being accessed by the  
3 information processing apparatus, transmits, to the information  
4 processing apparatus, a program file that serves as a local  
5 proxy for the information processing apparatus, wherein the web  
6 browser of the information processing apparatus includes an  
7 operating event detection function for detecting, as an  
8 operating event, an operation performed by a user on a screen  
9 on which the web contents are displayed, wherein the local  
10 proxy, which is operated by the information processing  
11 apparatus, embeds in the web contents received from the web  
12 server a program package, which is written in a function  
13 expansion program language, for expanding the functions  
14 available with the web browser, the program package permitting  
15 the web browser to perform a process for employing the  
16 operating event detection function belonging to a web browser  
17 to detect an operating event, a process for analyzing a string  
18 of operating events that are detected to extract a  
19 predetermined, specific operation, and a process for extracting  
20 target information for the specific operation from the web  
21 contents, and wherein the web browser transmits, to the portal  
22 site, information extracted by the web browser. This  
23 arrangement is superior because a portal site can obtain  
24 information concerning which of the web contents that an  
25 information processing apparatus received interested a user.  
26 The obtained information can then be used for services, such as  
27 research performed to ascertain web audience rates and a  
28 reduction in the search conditions for a search engine.

29 According to the present invention, an information processing  
30 apparatus comprises: browsing means, for displaying document  
31 data; operation detection means, for employing an input

1 operation, performed by a user when the user browses the  
2 document data displayed by the browsing means, to detect an  
3 operation defined as a specific operation that the user  
4 unintentionally performed to obtain interesting information;  
5 and character string extraction means, for extracting a  
6 character string that is displayed at a location whereat the  
7 specific operation that is detected by the operation detection  
8 means is performed on a display screen of the browsing means.  
9 An operation that a user unintentionally performs to obtain  
10 interesting information differs from an active, intentional  
11 effort, such as when a user inputs information to complete a  
12 questionnaire. This operation constitutes an unintentional act  
13 that occurs while the user is reading a document carefully,  
14 such as when the user is reading text while tracing it with a  
15 mouse pointer, or such as when the user is reading text within  
16 a selected range. The above arrangement is preferable because,  
17 when this operation is detected and the target information for  
18 the operation is obtained, information can be obtained  
19 concerning those contents in which a user is interested without  
20 requesting the user to actively and intentionally input  
21 information.

22 The character string extraction means extracts a sentence unit  
23 or a line unit that includes the character string that is  
24 displayed at the location whereat the specific operation is  
25 performed. To extract the sentence or the line as a unit, the  
26 location of a return code or the delimiter for the sentence or  
27 the line is detected by extending the range of the character  
28 string that is to be extracted, and subsequently extracting the  
29 text within that range. This arrangement is preferable because  
30 the contents which interest the user can be extracted as  
31 information that conveys a specific meaning.

1 According to the present invention, an information collection  
2 apparatus that is connected to an information processing  
3 apparatus, which includes a web browser that receives web  
4 contents from a web server and displays the web contents, and  
5 which collects information concerning the information  
6 processing apparatus, comprises: storage means, for storing a  
7 program file for embedding, in the web contents received from  
8 the web server, a program package, which is written in a  
9 function expansion program language, that expands the functions  
10 of the web browser and that permits the web browser to perform  
11 a process for employing an operating event detection function  
12 performed by the information processing apparatus to detect an  
13 operating event, a process for analyzing a string of operating  
14 events that are detected to extract a predetermined specific  
15 operation, and a process for extracting target information for  
16 the specific operation from the web contents; transmission  
17 means, for reading the program file from the storage means and  
18 for transmitting the program file to the information processing  
19 apparatus; and information collection means, for collecting the  
20 information extracted by the information processing apparatus.

21 The program file stored in the storage means of the information  
22 collection apparatus is prepared by a Java applet, and the  
23 program package, which is written in Java script, is embedded  
24 in the web contents. This arrangement is preferable because  
25 information can be extracted by using a web browser that  
26 corresponds to the Java language that is widely employed by  
27 personal computers. Furthermore, this arrangement is superior  
28 because, since the program file is prepared by a Java applet,  
29 it need not be distributed in advance to the information  
30 processing apparatus.

1 Further, according to the present invention, a character string  
2 extraction method comprises the steps of: detecting a  
3 predetermined, specific operation based on an input operation  
4 performed by a user on a display screen on which document data  
5 are displayed; and extracting, as a unit, a sentence or a line  
6 that includes a character string that is displayed at a  
7 location whereat the specific operation that is detected has  
8 been performed on the display screen.

9 In addition, according to the present invention, a character  
10 string extraction method comprises the steps of: detecting,  
11 based on an input operation performed by a user on a display  
12 screen on which document data are displayed, a tracing and  
13 reading movement by which the pointer of a pointing device is  
14 moved along lines in a document that is displayed; and  
15 extracting, as a unit, a sentence or a line that includes a  
16 character string that is displayed at a location whereat the  
17 tracing and reading operation has been performed on the display  
18 screen. This arrangement is especially superior because, when  
19 tracing and reading are performed, the text at the location  
20 whereat the tracing and reading are performed can be extracted,  
21 without requiring any active, intentional input operation by a  
22 user. Further, this arrangement is preferable because a  
23 sentence or a line unit is employed to extract the character  
24 string, so that the contents in which a user is interested can  
25 be extracted as information that establishes a specific  
26 meaning.

27 At the step of extracting a character string, a sentence or a  
28 line that includes a character string belonging to a document  
29 immediately above a character string selected using the pointer

1 is moved to another location on the display screen. For when a  
2 user reads a document while tracing it, he or she may read a  
3 line immediately above the line whereat the mouse pointer is  
4 located. This arrangement is superior because information that  
5 the user seems to be interested in reading can be thoroughly  
6 extracted.

7 Furthermore, according to the present invention, a character  
8 string extraction method comprises the steps of: employing an  
9 input operation performed by a user on a display screen on  
10 which document data are displayed to detect a line tracing and  
11 reading operation during which lines of a displayed document  
12 are pointed at in order, while the pointer of a pointing device  
13 is moved in a direction perpendicular to the lines; and  
14 extracting as a unit a sentence or a line that includes a  
15 character string that is displayed at a location whereat the  
16 line tracing and reading operation has been performed on the  
17 display screen. This arrangement is especially superior  
18 because when a user reads a long sentence while moving a mouse  
19 in the direction perpendicular to the lines of text, the text  
20 whereat the tracing and reading operation is performed can be  
21 extracted, without an active, intentional input operation being  
22 required of the user.

23 For horizontal text, a tracing and reading operation is  
24 detected in accordance with the movement of a pointer in the  
25 transverse direction that matches the direction of lines, and  
26 the line tracing and reading operation is detected in  
27 accordance with the vertical movement of the pointer  
28 perpendicular to the lines. On the other hand, for vertical  
29 text, the reading and tracing operation is detected by the  
30 vertical movement of the pointer that matches the direction of  
31 lines, and the line tracing and reading operation is detected



1 from the transverse movement of the pointer perpendicular to  
2 the lines.

3 According to the present invention, provided is a storage  
4 medium on which the input means of a computer stores a  
5 computer-readable program that permits the computer to perform:  
6 a process for displaying the contents of document data; an  
7 process for detecting a predetermined specific operation based  
8 on a user's operation on a display screen where the document  
9 data are displayed; and a process for extracting a character  
10 string that is displayed at a location whereat the specific  
11 operation that is detected is performed on the display screen.  
12 This arrangement is superior because when an information  
13 processing apparatus loads a program and displays document  
14 data, information can be obtained concerning the contents of  
15 the document in which a user shows an interest. When the  
16 obtained information is transmitted to a server, it can be used  
17 for services, such as research performed to ascertain web  
18 audience rates and a reduction in the search conditions for a  
19 search engine.

#### 20 Preferred Embodiment

21 The preferred embodiment of the present invention will be  
22 described in detail while referring to the accompanying  
23 drawings. First, an overview of the present invention will be  
24 given.

25 According to the present invention, it is assumed that a  
26 relationship is established between the unintentional movement  
27 of a mouse and what a user is interested in when the user is  
28 browsing a document displayed on a computer screen, and the

1 characteristic movement of the mouse is detected in order to  
2 extract information that it is assumed is interesting to the  
3 user. Since the information concerning the interest of the  
4 user is extracted based on the movement of the mouse, a target  
5 in which the user shows an interest can be specified by using a  
6 small unit, such as a word or a sentence in a document, or an  
7 inserted table.

8 In this example embodiment, the following five mouse movements  
9 are defined as operations that the user unintentionally  
10 performs for a target that he or she is interested in.

11 1. Moving the mouse pointer while the button of the mouse  
12 is depressed (dragging).

13 2. Pointing with the mouse pointer at a link that overlaps  
14 a second link.

15 3. Clicking on the link using the mouse.

16 4. Moving the mouse pointer in the transverse direction  
17 when the text is being read as the mouse pointer is moved  
18 along the lines of the text (hereinafter referred to as  
19 tracing and reading).

20 5. Using the mouse pointer to designate the line in text  
21 that is currently being read, and gradually moving the  
22 mouse pointer vertically as each line is read (hereinafter  
23 referred to as vertical tracing and reading).

24 In this embodiment, the movements are defined for a mouse that  
25 is used as a pointing device. However, when another pointing

1 device, such as a track ball or a pen tablet, is employed, it  
2 is assumed that substantially the same movements are performed  
3 for a target that the user is interested in. Therefore, in the  
4 following explanation, the pointing device type is not  
5 particularly designated, and the mouse is employed as an  
6 example.

7 The operations that a user intentionally performs for an  
8 interesting target are not limited to the five operations that  
9 have been explained. Other arbitrary operations that it is  
10 estimated that a user may perform for a target can be defined,  
11 and can be employed for information extraction.

12 Fig. 1 is a diagram for explaining the overall arrangement of  
13 an information extraction system according to this embodiment.  
14 An operating event detector 10 monitors the movement of a mouse  
15 on a document that is displayed on a computer screen, and  
16 detects an operating event. An operating event analyzer 20  
17 analyzes a string of operating events (hereinafter referred to  
18 as an operating event string) that are detected by the  
19 operating event detector 10, and extracts a specific operation  
20 that it seems the user performed for an interesting target. A  
21 text extractor 30 extracts, from the document that is displayed  
22 on the computer screen, the text that is fetched by the  
23 operating event analyzer 20. These components are implemented  
24 as program modules that permit the computer to perform the  
25 above processes.

26 In this embodiment, the display screen of a web browser used to  
27 display web contents that generally are employed on the  
28 Internet is defined as an area wherein the movement of a mouse  
29 is monitored. That is, the operating event detector 10 detects

1 an operating event in accordance with the movement of a mouse  
2 across the web contents (a home page) that are displayed by a  
3 web browser, the operating event analyzer 20 extracts a  
4 specific operation performed during the detected operating  
5 event, and the text extractor 30 extracts the target text as  
6 information that a user is interested in. In this case, the  
7 operating event detector 10, the operating event analyzer 20  
8 and the text extractor 30 can be implemented by the performance  
9 of a dynamic HTML function.

10 The operating event detector 10 can be implemented by embedding  
11 it in an HTML file using a script language, such as JavaScript.  
12 In JavaScript, the movement of a mouse, clicking or dragging,  
13 the selection of a character string, the depression/release of  
14 a key, and the scrolling of a screen can be extracted as  
15 events. For example, when event handler "OnMouseMove" is  
16 defined for the movement of a mouse, and is written in an HTML  
17 file, the movement of the mouse can be detected as an operating  
18 event. Furthermore, also when the movement of a mouse is to be  
19 monitored on a display screen for a document, other than web  
20 contents, that is prepared by a predetermined application  
21 program, the API of an operating system can be employed to  
22 extract an operating event in accordance with a specific mouse  
23 movement.

24 The operating event analyzer 20 analyzes an operating event  
25 string that is detected by the operating event detector 10, and  
26 determines whether the operating event string is pertinent to a  
27 specific operation that has been defined in advance. When the  
28 operating event string is pertinent to the specific operation,  
29 the operating event analyzer 20 notifies the text extractor 30  
30 that the operation has been performed. Further, the operating

1 event analyzer 20 transmits information, such as the position  
2 whereat the operation was performed, to the text extractor 30  
3 in order for it to be employed for the extraction of text. The  
4 specific operation that has been defined in advance is an  
5 operation that it is estimated a user will unintentionally  
6 perform for an interesting target. In this embodiment, the  
7 above described operations, i.e.,

8 1. selecting of text,

9 2. pointing to a link,

10 3. clicking on a link,

11 4. tracing and reading, and

12 5. vertical tracing and reading,

13 are defined as specific operations. A detailed explanation  
14 will be given later for the processing used to extract these  
15 specific operations from an operating event string that is  
16 detected by the operating event detector 10.

17 When the text extractor 30 receives, from the operating event  
18 analyzer 20, a notification that a specific operation has been  
19 extracted, the text extractor 30 additionally receives, from  
20 the operating event analyzer 20, information such as the  
21 coordinate value required for extraction of the text.

22 Thereafter, in accordance with the received information, the  
23 text analyzer 30 obtains the target text for the specific  
24 operation from the pertinent position of the web contents that  
25 are displayed by the web browser. A detailed explanation will

1 be given later for the text extraction processing performed for  
2 each operation that is extracted by the operating event  
3 analyzer 20.

4 Then, the obtained text is transmitted to another system that  
5 employs the pertinent text. For example, a system that  
6 conducts research to ascertain web audience rates, or a search  
7 engine can receive the text obtained by the text extractor 30,  
8 and can employ the text as information related to the target  
9 that the user is interested in.

10 Fig. 2 is a conceptual diagram for explaining the processing  
11 perform by the operating event detector 10, the operating event  
12 analyzer 20 and the text extractor 30. In Fig. 2, the  
13 operating event detector 10, the operating event analyzer 20  
14 and the text extractor 30 are written in JavaScript and are  
15 embedded in web contents 200.

16 While referring to Fig. 2, first, assume that a specific  
17 operation is performed by using a mouse for predetermined text  
18 201 in the web contents 200 that are displayed by a web browser  
19 (211). Then, the operating event detector 10 detects an  
20 operating event based on the movement of the mouse, and  
21 transmits the operating event to the operating event analyzer  
22 20 (212). Next, the operating event analyzer 20 analyzes the  
23 operating event string and extracts a specific operation.  
24 Following this, a notification that the specific operation has  
25 been extracted and information concerning the contents of the  
26 operation are transmitted to the text extractor 30 (213).  
27 Thereafter, the text extractor 30 performs a process in  
28 accordance with the specific operation, and extracts the text  
29 201 from the web contents 200 (214).

1 Since it is assumed that the thus obtained text 201 is  
2 information that the user was interested in when he or she  
3 browsed the web contents 200, this information can be used for  
4 various services, such as research performed to ascertain a web  
5 audience rate and a reduction in the search conditions for a  
6 search engine. The extracted text 201 must then be transmitted  
7 to an operator who desires to use the text 201 as information  
8 concerning the user, and for this various methods may be  
9 employed: the text 201 may be embedded in a script form in the  
10 web contents 200 and transmitted by using a function of the web  
11 browser, or a predetermined program may be provided for an  
12 information processing apparatus and its function may be  
13 employed to transmit the text.

14 The text acquisition processing for the embodiment will now be  
15 described in detail for each of the specific operations.  
16 First, an explanation will be given for how the selection of  
17 text is performed for a specific operation.

18 From an operating event string that is transmitted by the  
19 operating event detector 10, the operating event analyzer 20  
20 detects a "select" event that is generated when a user selects  
21 text. Based on the "select" event, the operating event  
22 detector 10 obtains a "selection" object that corresponds to  
23 the text selection operation. When the text selection  
24 operation is terminated, this can be identified by a "mouseup"  
25 event that is generated when a mouse button is released by a  
26 user. For dynamic HTML, when text selection is performed an  
27 area that is selected can be obtained as a "selection" object.  
28 Therefore, in a web browser that corresponds to the dynamic  
29 HTML, the "selection" object can be obtained immediately at the  
30 time the text is selected by a user.

1 The text extractor 30 extracts selected text by using the  
2 "selection" object that is generated by the operating event  
3 analyzer 20. Thus, as is shown in Fig. 4, the character string  
4 "cat is very" is extracted from the sentence "This cat is very  
5 smart." The extracted character string "cat is very" is  
6 transmitted to a predetermined system, and is used as  
7 information that the user is interested in.

8 Fig. 4 is a diagram for explaining the program required when  
9 the text extraction process of the text extractor 30 is carried  
10 out using dynamic HTML. The diagram is used for explaining the  
11 text extraction process when the text string "cat is very" in  
12 the sentence "This cat is very smart" is selected.

13 In this example, a "getSelectedText" function is defined as the  
14 function used for the extraction of text. The argument for the  
15 "getSelectedText" function is the selection object "sl," which  
16 is generated by a user's selection of text (a "selection"  
17 object 401 in Fig. 4). On the third line of the program list  
18 in Fig. 3, the TextRange object "tr" ("TextRange" object 402 in  
19 Fig. 4) is generated by the "createRange" method based on the  
20 obtained selection object "sl". The "TextRange" object is an  
21 object for a text operation using dynamic HTML. On the fourth  
22 line of the program list, the selected text "cat is very" (text  
23 403 in Fig. 4) is extracted by using the "text" property of the  
24 TextRange object.

25 An explanation will now be given for an example wherein  
26 pointing to a link is performed as a specific operation.

27 Of the events in an operating event string received from the  
28 operating event detector 10, the operating event analyzer 20



1 employs an event that occurs when a mouse pointer is placed on  
2 a link, and an event that occurs when the mouse pointer is  
3 removed from the link, so that a link pointing operation is  
4 detected. In this embodiment, at the same time as these events  
5 occur, text for which a link tag is provided and text that  
6 includes a portion into which a link is extended are extracted  
7 as a unit consisting of a sentence or a line. Further, in  
8 order to exclude a case wherein a mouse pointer simply passes  
9 through a link and a case wherein a mouse pointer accidentally  
10 remains on the link for an extended period of time, the  
11 pointing duration is measured and is used as a determination  
12 condition.

13 Specifically, first, when an event occurs indicating that a  
14 mouse pointer has been placed on a link (a "mouseover" event),  
15 a time  $t_1$  for the occurrence is stored. Then, when an event  
16 occurs indicating that the mouse pointer has been moved (a  
17 "mousemove" event), the position (coordinate value) of the  
18 mouse pointer on the link is obtained. Following this, when an  
19 event occurs indicating that the mouse pointer has been removed  
20 from the link (a "mouseout" event), a time  $t_2$  for the  
21 occurrence is obtained. If  $T_1 < (t_2 - t_1) < T_h$  is established  
22 for the threshold values  $T_1$  and  $T_h$ , it is assumed that a link  
23 pointing operation using the mouse has been performed. The  
24 text extractor 30 is notified to this effect, and the position  
25 information for the mouse pointer that is obtained by the  
26 "mousemove" event is transmitted to the text extractor 30.

27 The threshold values  $T_1$  and  $T_h$  are provided in order to exclude  
28 a case wherein a mouse pointer simply passes a link and a case  
29 wherein the mouse pointer accidentally remains on the link for  
30 an extended period of time. That is, when  $T_1 \geq (t_2 - t_1)$  is

1 established, it is assumed that the mouse pointer merely passed  
2 the link, and no notification is transmitted to the text  
3 extractor 30. And when  $(t_2 - t_1) \geq T_h$  is established, it is  
4 assumed that the mouse pointer accidentally remained on the  
5 link, and again, no notification is transmitted to the text  
6 extractor 30.

7 When the text extractor 30 receives a notification that a link  
8 pointing operation has been performed, and when the place  
9 whereat the pointing operation took place is a link tag, the  
10 text extractor 30 extracts text for which the link tag is  
11 provided as a sentence or a line unit. If at the site whereat  
12 the pointing operation has been performed is a link that is  
13 extended to a predetermined location, the text extractor 30  
14 extracts as a sentence or a line unit the text that includes  
15 that link.

16 A method for extracting text as a sentence or a line unit will  
17 now be described. To delimit text by separating it into  
18 sentences or lines, first, the range of the text to be  
19 extracted is gradually expanded from the position (coordinate  
20 value) whereat the target link tag for the pointing operation  
21 is provided or whereat the pointing operation has been  
22 performed. When the return code or a symbol, such as a period  
23 or a comma, that represents a delimiter for a line or a  
24 sentence appears, the expansion of the range of the text is  
25 halted, and the obtained text string is extracted.

26 Fig. 5 is a diagram for explaining the program required when  
27 the text extraction process of the text extractor 30 is  
28 implemented by using dynamic HTML. Fig. 6 is a diagram for  
29 explaining the text extraction process that is performed when

1 the pointing operation is performed for a link (the underlined  
2 "cat"), in the sentence "This cat is very smart," contained in  
3 the web contents document that is displayed by the web browser.

4 In this example, the "getLinkTagText" function and the  
5 "getLinkText" function are defined as the functions used for  
6 extracting text.

7 The "getLinkTagText" function is a function for extracting text  
8 for which a link tag is provided, and the argument is an anchor  
9 object, an "anchor." On the third line of the program list in  
10 Fig. 5, all the text for which the pertinent link tag is  
11 provided is extracted. The "getLinkText" function is a  
12 function for extracting as a sentence or a line unit text that  
13 includes a portion into which a link is extended, and the  
14 arguments are the coordinates where the mouse pointer is  
15 located. The text extraction processing performed by the  
16 "getLinkText" function will now be described while referring to  
17 Fig. 6.

18 On the eighth line of the program list in Fig. 5, the  
19 "createTextRange" method is employed for the "body" object, and  
20 the "TextRange" object that includes the entire page of the web  
21 page is generated ("TextRange" object 601 in Fig. 6). Then, on  
22 the ninth line of the program list, the "moveToPoint" method is  
23 employed to designate, as a "TextRange" object, a character  
24 that is pointed at the mouse pointer ("TextRange" object 602 in  
25 Fig. 6). Next, on the tenth line of the program list, the  
26 function for changing the selected area of the text (the  
27 "changeTextRange" function in Fig. 6 is designated for the  
28 performance of this process) is employed to expand the selected  
29 range for the "TextRange" object to include a sentence unit or  
30 a line unit ("TextRange" object 603 in Fig. 6).  
31 Finally, on the eleventh line of the program list, the "Text"

1 property of the TextRange object is employed to extract "This  
2 cat is very smart." (text 604 in Fig. 6).

3 An explanation will now be given for a case wherein clicking on  
4 a link is the specific operation that is performed. Of the  
5 events in the operating event string received from the  
6 operating event detector 10, the operating event analyzer 20  
7 employs an event that occurs when a link is clicked on to  
8 detect the link clicking operation. As well as for the link  
9 pointing operation, in this embodiment, at the same time an  
10 event occurs, the text for which a link tag is provided and the  
11 text that includes a portion into which a link is extended are  
12 extracted as a sentence unit or a line unit. Specifically,  
13 when an event occurs indicating that a mouse pointer has been  
14 placed on a link (a "mouseover" event), the occurrence time t1  
15 is stored. Then, when a mouse moving event (a "mousemove"  
16 event) occurs, the position (a coordinate value) of the mouse  
17 pointer on the link is obtained. Following this, when a click  
18 event (a "click" event) occurs, the text extractor 30 is  
19 notified of this event occurrence, and position information for  
20 the mouse pointer, which was obtained at the time of the  
21 "mousemove" event, is transmitted to the text extractor 30.

22 When the text extractor 30 receives notification of the link  
23 clicking operation, and when the place whereat the link click  
24 operation occurred is a link tag, the text extractor 30  
25 extracts as a sentence or a line unit the text associated with  
26 the link tag. And if the place whereat the link clicking  
27 operation occurs is a link that is extended into a  
28 predetermined portion of a sentence, the text including the  
29 link is extracted as a sentence or a line unit. Since the text  
30 extraction process is performed by the text extractor 30 in the

1 same manner as the pointing operation, no further explanation  
2 for it will be given.

3 An explanation will now be given for the tracing and reading  
4 operation. The tracing and reading operation is extracted by  
5 using the position (the coordinates) of a mouse pointer that is  
6 obtained by using a mouse movement event and an event  
7 occurrence time. The movement of a mouse during the tracing  
8 and reading operation is linear and horizontal, and various  
9 methods can be used for detecting this movement. However, for  
10 this embodiment the following method is employed.

11 First, the sequential horizontal movement of the mouse is  
12 detected. When the distance that the mouse travels  
13 sequentially and horizontally is equal to or greater than a  
14 predetermined threshold value, this movement is detected as a  
15 tracing and reading operation. This is because an accidental  
16 linear, horizontal movement of the mouse is excluded. Since it  
17 is expected that a mouse would not travel far during such an  
18 accidental movement, an appropriate threshold value is set to  
19 exclude it. Then, each time a mouse moving event occurs, the  
20 sequential horizontal movement of the mouse can be detected and  
21 used to determine the following conditions.

22 First, the inclination of the movement of the mouse, which is  
23 obtained from several (two to four) of the latest coordinates  
24 for the mouse pointer, is employed to determine whether the  
25 mouse is being moved horizontally across on a display screen.  
26 Second, a difference in the occurrence times between a current  
27 event and an immediately preceding event is employed to  
28 determine whether the movement of the mouse has been  
29 discontinued.

1 When the above conditions are established and when it is  
2 ascertained that the mouse is moving horizontally and that its  
3 movement has not been discontinued, it is assumed that the  
4 mouse is traveling sequentially and horizontally. And when one  
5 of the two conditions is not established, it is assumed that  
6 the sequential horizontal movement has been terminated.

7 Based on the above premise, an explanation will now be given  
8 for the process performed by the operation event analyzer 20 to  
9 detect the tracing and reading operation. In the following  
10 explanation, a parameter Ar is a threshold value related to the  
11 inclination used to determine whether the direction in which a  
12 mouse travels is to be regarded as the horizontal direction. A  
13 parameter Tr is a threshold value related to a stop time used  
14 to determine whether the sequential movement of the mouse is  
15 continuing. And a parameter L is a threshold value related to  
16 the distance of the travel used to determine whether the  
17 sequential horizontal movement that has been detected is a  
18 tracing and reading operation. While the coordinates that are  
19 used are represented by orthogonal x-y coordinates, X being  
20 defined as the horizontal direction across the display screen  
21 (the direction parallel to lines), and Y direction being  
22 defined as the vertical direction on the display screen (the  
23 direction perpendicular to lines).

24 Each time the "mousemove" event occurs, the operation event  
25 analyzer 20 obtains the difference  $(x_i - x_{i-n}, y_i - y_{i-n})$  between the  
26 coordinate  $(x_i, y_i)$  of the mouse pointer and the coordinate  
27  $(x_{i-n}, y_{i-n})$  of the mouse pointer when the "mousemove" event  
28 occurred n times before. When the difference in the x  
29 direction (horizontal) is a positive value, the inclination a  
30 is calculated using the following equation  
31  $a = (y_i - y_{i-n}) / (x_i - x_{i-n})$ . The time interval  $t_a$  between the time

1  $t_i$  of the last event occurrence and the time  $t_{i-1}$  of the  
2 preceding event occurrence is calculated using the following  
3 equation

$$t_d = t_i - t_{i-1}.$$

5 One of the following four processing types is performed in  
6 accordance with the obtained values for  $a$  and  $t_d$ .

7 (1) A case wherein the flag  $r_{flag}$  that represents the  
8 sequential horizontal movement is OFF and  $a < A_r$  and  $t_d <$   
9  $T_r$  have been established (the inclination and the time  
10 interval from the preceding event fall within the range of  
11 the threshold value), and it is assumed that the  
12 horizontal and sequential movement of the mouse has begun,  
13 the flag  $r_{flag}$  has been set to ON and the coordinates  $(x_i,$   
14  $y_i)$  of the mouse pointer have been stored.

15 (2) A case wherein the flag  $r_{flag}$  is OFF and  $a \geq A_r$  or  $t_d \geq$   
16  $T_r$  has been established (at the least, either the  
17 inclination or the time interval from the preceding event  
18 exceeds the range of the threshold value), and it is  
19 assumed that the mouse is not traveling horizontally and  
20 sequentially.

21 (3) A case wherein the flag  $r_{flag}$  is ON and  $a < A_r$  and  $t_d <$   
22  $T_r$  have been established, and it is assumed that the mouse  
23 is moving horizontally and sequentially and that the  
24 coordinates  $(x_i, y_i)$  of the mouse pointer have been stored.

25 (4) A case wherein the flag  $r_{flag}$  is ON and  $a \geq A_r$  or  $t_d \geq T_r$   
26 has been established, and it is assumed that the

1 horizontal and sequential movement of the mouse has ended  
2 and the flag  $r_{flag}$  is set to OFF. The stored coordinates of  
3 the mouse pointer that are obtained while the mouse was  
4 moving horizontally and sequentially are employed to  
5 calculate the x coordinates at the start point and the end  
6 point of the movement, the average of the y coordinates  
7 obtained during the movement, and the distance  $l$  of the  
8 movement. If  $l > L$ , the distance of the extracted  
9 movement is greater than the threshold value  $L$ , and this  
10 movement is not determined to be a tracing and reading  
11 operation. But if  $l \leq L$ , the movement is determined to be  
12 a tracing and reading operation.

13 When a tracing and reading operation is detected in the above  
14 described manner, the operation event analyzer 20 notifies the  
15 text extractor 30 that the tracing and reading operation has  
16 been performed, and also transmits to the text extractor 30 the  
17 coordinates (position information) of the mouse pointer at the  
18 tracing and reading start point and end point that were  
19 obtained for the "mousemove" event.

20 Upon receipt of the notification that the reading and tracing  
21 operation has been performed, the text extractor 30 extracts  
22 text at the place whereat the tracing and reading operation was  
23 performed. In this case, the text on a line that the mouse  
24 pointer overlapped during the reading and tracing operation,  
25 and the text on the line immediately above are extracted as  
26 sentence or line units. This is because during a tracing and  
27 reading operation a user tends to read a line that the mouse  
28 pointer overlaps or the line immediately above. Therefore,  
29 since the text on the line that the mouse pointer overlaps and  
30 on the line immediately above is extracted, the information



1 that the user seems to be interested in seldom is not the  
2 extraction target. The text may also be extracted from either  
3 the line the mouse pointer overlaps or the line immediately  
4 above, instead of being extracted from the two lines.  
5 To identify the line immediately above the line overlapped by  
6 the mouse pointer, the lines are sequentially examined upward  
7 in the y coordinate direction by employing the position of the  
8 mouse pointer as a reference, and when a character string that  
9 is detected has been changed, it is assumed that the line has  
10 been shifted to the line immediately above. Specifically, at  
11 first, three characters, i.e., a character whereat the mouse  
12 pointer is located, a character m characters before and a  
13 character n characters after, m and n being numerals equal to  
14 or greater than two, are stored. Then, the coordinates are  
15 moved several dots from the position of the mouse pointer in  
16 the y coordinate direction, and a character at the sequentially  
17 obtained coordinates, a character positioned m characters  
18 before and a character positioned n characters after are  
19 obtained. These obtained characters are compared with the  
20 character at the position whereat the mouse pointer is located,  
21 and the characters before and after that character, all of  
22 which are stored in advance. When the three characters all  
23 match, it is assumed that the line is still that one overlapped  
24 by the mouse pointer, and for the other case, it is assumed  
25 that the current line is the one immediately above.

26 An explanation will now be given for the reason that a total of  
27 three characters, the character whereat the mouse pointer is  
28 located and the two characters that precede and succeed it by  
29 several characters, are employed in order to identify the line  
30 the mouse pointer overlapped and the line immediately above.  
31 When only one character is employed to identify these two

1 lines, the character pointed at by mouse pointer may by  
2 accident match the character positioned above. Thus, to  
3 increase the reliability, a plurality of characters are  
4 employed to identify the lines. Characters that are separated  
5 by a distance of several characters from the character at which  
6 the mouse pointer is pointed are employed because when the same  
7 word is positioned above a word that includes a character that  
8 the mouse pointer overlaps, several characters between the  
9 upper and lower lines, including the character at the position  
10 of the mouse pointer, may be identical, and thus the  
11 possibility that this phenomenon may occur must be eliminated.  
12 Further, characters that are located above and below the  
13 character at the position of the mouse pointer are employed for  
14 the following reason. When the character at the position of  
15 the mouse pointer is the first or the last on a page, and when  
16 characters are extracted only forward or backward, the  
17 character positioned at a distance of several characters from  
18 the character pointed at by the mouse pointer may not be on the  
19 pertinent page; however, so long as characters used for  
20 comparison are extracted before and after the character at the  
21 position of the mouse pointer, the lines can be identified.  
22 The processing for identifying the line immediately above the  
23 line the mouse pointer overlaps will now be described while  
24 referring to Fig. 7. In Fig. 7, the three characters ("j," "r"  
25 and "e") on the line the mouse pointer overlaps are stored.  
26 Later, the target coordinates (the selection range for the  
27 "TextRange" object that will be described later) are moved  
28 upward from the coordinates at the position of the mouse  
29 pointer in the y coordinate direction, and the three characters  
30 ("i," "r" and "o") on the line at the coordinates are obtained.  
31 The characters at the position of the mouse pointer are matched  
32 "r"s, but the characters in the two pairs "j" and "i" and "e"

1 and "0" differ, so that the line can be assumed to be the one  
2 immediately above.

3 Based on the above premise, an explanation will now be given  
4 for the processing performed by the text extractor 30 to  
5 extract text from the target line to be used for the tracing  
6 and reading operation and the line immediately above. Fig. 8  
7 is a diagram for explaining the program that is required when  
8 the text extraction process of the text extractor 30 is  
9 implemented by using dynamic HTML.

10 In this example, the "getTracedText" function is defined to  
11 extract the text when the tracing and reading operation is  
12 detected. The "getTracedText" function is a function whereby  
13 after the operation event analyzer 20 has detected the tracing  
14 and reading operation, the coordinates of the mouse pointer are  
15 employed to extract the text on the line the mouse pointer  
16 overlaps or on the line immediately above. The arguments x and  
17 y are the coordinates (x, y) whereat the mouse pointer is  
18 located. In addition, "up" denotes the line to be extracted,  
19 and when up = false, the line that the mouse pointer overlaps  
20 is extracted, while when up = true, the line immediately above  
21 the line the mouse pointer overlaps is extracted. On the third  
22 line of the program listing in Fig. 8, the "TextRange" object  
23 is generated, and on the fourth line, the selection range for  
24 the "TextRange" object is shifted to the character that is  
25 positioned at the coordinates (x, y) whereat the mouse pointer  
26 is located.

27 The process described on the fifth to twenty-fifth lines of the  
28 program list is one used to identify the line immediately above  
29 the line the mouse pointer overlaps. First, on the seventh to  
30 eleventh lines, the three characters (centerchar1, rightchar1

1 and leftchar1) on the line the mouse pointer overlaps are  
2 obtained. These characters are the character (centerchar1) at  
3 the position of the mouse pointer, the character (rightchar1)  
4 positioned after at a distance of CMOVE characters, and the  
5 character (leftchar1) positioned before at a distance of CMOVE  
6 characters.

7 On the twelfth to twenty-fourth lines, the coordinates are  
8 moved up from the position of the mouse pointer in the y  
9 coordinate direction PMOVE points. Then, the three characters  
10 (centerchar2, rightchar2 and leftchar2), i.e., the character at  
11 the current position and the two characters positioned CMOVE  
12 characters to the front and the rear, are obtained. These  
13 obtained characters are compared with the characters  
14 (centerchar1, rightchar1 and leftchar1) obtained from the  
15 seventh to the eleventh lines, and if even one character is  
16 different, the line is identified as the line immediately  
17 above.

18 Thereafter, on the twenty-sixth line, the selection range of  
19 the "TextRange" object is expanded until it is equal to a  
20 sentence or a line unit, and on the twenty-seventh line, the  
21 text on the pertinent line is extracted. The same method is  
22 employed as that which was explained for use for the link  
23 pointing operation, where text is extracted as a sentence or a  
24 line unit from the line the mouse pointer overlaps or from the  
25 line immediately above.

26 An explanation will now be given for a case where the vertical  
27 tracing and reading operation is the specific one that is  
28 performed.

29 For the vertical tracing and reading operation, a mouse pointer

1 is pointed at lines of text that are being read as it is  
2 gradually moved down, little by little, in the direction  
3 perpendicular to the lines. Thus, each movement of a mouse  
4 during this operation is performed very slowly, and spans only  
5 a short distance. The vertical tracing and reading operation  
6 is extracted by using the coordinates (x, y) of the mouse  
7 pointer that are obtained by the mouse moving event, and the  
8 occurrence time for the event. Various methods have been  
9 proposed for the detection of the vertical tracing and reading  
10 operation, but the following method is employed for this  
11 embodiment.

12 First, the sequential vertical travel of the mouse is detected.  
13 When the distance of the sequential vertical travel is equal to  
14 or greater than a threshold value, it is assumed that this  
15 movement is being used for the vertical tracing and reading  
16 operation. This is because the possibility that the vertical  
17 and linear travel of the mouse is accidental can be eliminated.  
18 The sequential vertical movement of the mouse can be detected  
19 by determining whether the following conditions are established  
20 each time the mousemove event occurs.

21 First, the displacement distance between the coordinates of the  
22 mouse pointer for the last event and the coordinates of the  
23 mouse pointer for the preceding event is employed to determine  
24 whether the mouse is moving vertically in a window. Since each  
25 movement of the mouse during the vertical tracing and reading  
26 operation is performed very slowly and spans only a short  
27 distance, instead of using inclination, the displacement  
28 distance for the coordinates of the mouse pointer is employed  
29 to determine whether the operation is being performed.  
30 Second, a difference in the occurrence time between the last  
31 event and the preceding event is employed to determine whether

1 the movement of the mouse has been discontinued.

2 When these conditions are established, and when it is  
3 ascertained that the mouse is being moved vertically and that  
4 its movement has not been discontinued, it is assumed that the  
5 mouse is traveling vertically and sequentially. But when one  
6 of the two conditions can not be established, it is assumed  
7 that the vertical and sequential movement has been terminated.

8 Based on the above described premise, an explanation is given  
9 for the processing performed by the operation event analyzer 20  
10 to detect the vertical tracing and reading operation. In the  
11 following explanation, parameters  $X_r$  and  $Y_r$  are threshold  
12 values and are used for displacement distances during the  
13 travel of the mouse in order to determine whether the direction  
14 in which the mouse is moving should be regarded as the vertical  
15 one. Parameter  $T_r$  is a threshold value for the stop time that  
16 is used to determine whether the movement of the mouse is  
17 continuous. And parameter  $L$  is a threshold value for the  
18 distance travelled that is used to determine whether the  
19 sequential and vertical movement that is detected is for the  
20 vertical tracing and reading operation. The coordinates are  
21 represented by the orthogonal x-y coordinates, with the x  
22 direction being defined as the horizontal direction on the  
23 display screen (i.e., the direction parallel to the lines) and  
24 the y direction being defined as the vertical direction on the  
25 display screen (i.e., the direction perpendicular to the  
26 lines).

27 Each time a "mousemove" event occurs, the operation event  
28 analyzer 20 calculates a difference  $(x_i - x_{i-1}, y_i - y_{i-1})$  between the  
29 coordinates  $(x_i, y_i)$  of the mouse pointer and the coordinates  
30  $(x_{i-1}, y_{i-1})$  of the mouse pointer for the preceding "mousemove"

1 event. When  $0 < y_i - y_{i-1} < Y_r$  is established, an absolute value  $d$   
2 of the difference in the  $x$  direction is calculated using the  
3 following equation

$$4 \quad d = |x_i - x_{i-1}|.$$

5 Further, a time interval  $t_d$  between the occurrence time  $t_i$  for  
6 the last event and the occurrence time  $t_{i-1}$  for the preceding  
7 event is calculated using the following equation

$$8 \quad t_d = t_i - t_{i-1}.$$

9 In accordance with the values obtained for  $d$  and  $t_d$ , one of the  
10 following four process types is performed.

11 (1) A case wherein the flag  $r_{flag}$  that represents the  
12 sequential vertical movement is OFF and  $d < X_r$  and  $t_d < T_r$   
13 are established (the displacement in the  $x$  direction and  
14 the time interval from the preceding event fall within the  
15 range of the threshold value), and it is assumed that the  
16 vertical and sequential movement of the mouse has begun,  
17 that the flag  $r_{flag}$  has been set to ON and the coordinates  
18  $(x_i, y_i)$  of the mouse pointer have been stored.

19 (2) A case wherein the flag  $r_{flag}$  is OFF and  $d \geq X_r$  or  $t_d \geq$   
20  $T_r$  is established (at the least, either the displacement  
21 in the  $x$  direction or the time interval from the preceding  
22 event exceeds the range of the threshold value), and it is  
23 assumed that the mouse is not travelling vertically and  
24 sequentially.

25 (3) A case wherein the flag  $r_{flag}$  is ON and  $d < X_r$  and  $t_d <$

1 Tr are established, and it is assumed that the mouse is  
2 moving vertically and sequentially and the coordinates ( $x_i$ ,  
3  $y_i$ ) of the mouse pointer have been stored.

4 (4) A case wherein the flag  $r_{flag}$  is ON and  $d \geq X_r$  or  $t_d \geq T_r$   
5 is established, and it is assumed that the vertical and  
6 sequential movement of the mouse is terminated and the  
7 flag  $r_{flag}$  has been set to OFF. The coordinates of the  
8 mouse pointer that are stored, which are obtained while  
9 the mouse is moving vertically and sequentially, are  
10 employed to calculate the y coordinates at the start point  
11 and the end point of the movement, the average for the x  
12 coordinates obtained during the movement, and the distance  
13  $l$  of the movement. If  $l > L$ , the distance of the  
14 extracted movement is greater than the threshold value  $L$ ,  
15 and this movement is not determined to be a vertical  
16 tracing and reading operation. But if  $l \leq L$ , the movement  
17 is determined to be a vertical tracing and reading  
18 operation.

19 When a vertical tracing and reading operation is detected in  
20 the above described manner, the operation event analyzer 20  
21 notifies the text extractor 30 that of the tracing and reading  
22 operation is being performed, and also transmits to the text  
23 extractor 30 the coordinates (position information) of the  
24 mouse pointer at the tracing and reading start point and end  
25 point that were obtained for the mousemove event.

26 Upon receipt of the notification that a vertical reading and  
27 tracing operation has been performed, the text extractor 30  
28 extracts text at the place whereat the vertical tracing and  
29 reading operation has been performed. In this case, the text



1 on a line the mouse pointer overlapped during the reading and  
2 tracing operation, and the text on the line immediately above  
3 are extracted as sentence or line units. The text may be  
4 extracted from either the line which was overlapped by the  
5 mouse pointer or the line immediately above.

6 Since the text extraction processing by the text extractor 30  
7 is performed in the same manner as for the tracing and reading  
8 operation described above, no further explanation for it will  
9 be given.

10 In the above description, the operation for moving the mouse  
11 pointer horizontally along the lines of the text is called  
12 tracing and reading, and the operation for using the mouse  
13 pointer to point at the current line in the text and for slowly  
14 shifting the mouse pointer down, little by little, in the  
15 direction perpendicular to the lines is called vertical tracing  
16 and reading. This is because it is assumed that the text is  
17 written horizontally. When the text is written vertically,  
18 however, vertical reading performed along the lines corresponds  
19 to the tracing and reading operation, and horizontal reading  
20 performed perpendicular to the lines corresponds to the  
21 vertical reading and tracing operation.

22 The information extraction system in this embodiment is  
23 connected to a network, such as the Internet, and functions as  
24 an information processing apparatus on which a web browser is  
25 mounted. That is, the web contents that the information  
26 processing apparatus receives from a web server are displayed  
27 by the web browser, and each of the above described operations  
28 that a user unintentionally performs, when he or she is  
29 browsing through data provided by the displayed web contents,

1 is determined to be an operating event and the target text for  
2 the detected operation is extracted.

3 The various modes that follow can be employed as means for  
4 providing, for the information processing apparatus, the  
5 function of the information extraction system for the  
6 embodiment. Typical modes will now be described while  
7 referring to Figs. 9 to 12.

8 In the mode shown in Fig. 9, the operation event detector 10,  
9 the operation event analyzer 20 and the text extractor 30 are  
10 written in a script language, such as JavaScript, and are  
11 embedded in advance in web contents 101 that are stored in a  
12 web server 100. With this arrangement, when an information  
13 processing apparatus 110 receives the web contents 101 from the  
14 web server 100, based on script 102 that is embedded in the web  
15 contents 101, a web browser 111 performs a process for  
16 detecting an operating event, a process for analyzing the  
17 operating event string and for detecting the above described  
18 specific operation, such as the selection of a character  
19 string, the pointing to a link or the tracing and reading, and  
20 a process for extracting, for the pertinent operation, a target  
21 character string that is thereafter transmitted to the web  
22 server 100. The function for returning the extracted text to  
23 the web server 100 may be provided by embedding it, as well as  
24 the operating event detector 10, the operating event analyzer  
25 20 and the text extractor 30, as a script in the web contents  
26 101, or together with the web contents 101, it may be  
27 distributed as a Java applet to the information processing  
28 apparatus 110.  
29 Since the thus obtained text can be regarded as information  
30 that the user has shown an interest in while browsing the web

1 contents 101, the web server 100 can employ the text to provide  
2 various services, such as research performed to ascertain web  
3 audience rates and a reduction in the search conditions for a  
4 search engine.

5 In the mode shown in Fig. 10, the web server 100 includes a  
6 writing processor 120 for writing the operating event detector  
7 10, the operating event analyzer 20 and the text extractor 30  
8 in the web contents 101 using a script language, such as  
9 JavaScript. In this mode, when a request to access the web  
10 contents 101 is issued by the information processing apparatus  
11 110, the writing processor 120 of the web server 100 writes in  
12 the web contents 101 the script for carrying out the functions  
13 of the operating event detector 10, the operating event  
14 analyzer 20 and the text extractor 30. Then, the resultant web  
15 contents 101 are transmitted to the information processing  
16 apparatus 110.

17 Based on the script that is embedded in the received web  
18 contents 101, the web browser 111 of the information processing  
19 apparatus 110 performs the process for detecting an operating  
20 event, the process for analyzing the operating event string and  
21 for detecting a specific operation, such as the selection of a  
22 character string, the pointing to a link or the tracing and  
23 reading, and the process for extracting, for the pertinent  
24 operation, a target character string that is thereafter  
25 transmitted to the web server 100. The function for  
26 transmitting the extracted text to the web server 100 may be  
27 provided by embedding it, as well as the operating event  
28 detector 10, the operating event analyzer 20 and the text  
29 extractor 30, in the web contents 101 as a script, or together  
30 with the web contents 101, it may be distributed in the form of

1 a Java applet to the information processing apparatus 110.

2 Since the thus obtained text can be regarded as information  
3 that the user has shown an interest in while browsing the web  
4 contents 101, the web server 100 can employ the text to provide  
5 various services, such as research performed to ascertain web  
6 audience rates and a reduction in the search conditions for a  
7 search engine.

8 In the mode shown in Fig. 11, a proxy server 130 is located  
9 between the web server 100 and the information processing  
10 apparatus 110, and writes the operating event detector 10, the  
11 operating event analyzer 20 and the text extractor 30 in the  
12 web contents 101 using a script language, such as JavaScript.  
13 In this mode, when a request to access the web contents 101 is  
14 issued by the information processing apparatus 110, the proxy  
15 server 130 receives from the web server 100 the web contents  
16 101 and writes in them the script for carrying out the  
17 functions of the operating event detector 10, the operating  
18 event analyzer 20 and the text extractor 30. It then transmits  
19 the resultant web contents 101 to the information processing  
20 apparatus 110.

21 Based on the script that is embedded in the received web  
22 contents 101, the web browser 111 of the information processing  
23 apparatus 110 performs the process for detecting an operating  
24 event, the process for analyzing the operating event string to  
25 detect a specific operation, such as the selection of a  
26 character string, the pointing to a link or the tracing and  
27 reading, and the process for extracting, for the pertinent  
28 operation, a target character string that is thereafter  
29 transmitted to the proxy server 130. The function for

1 transmitting the extracted text to the proxy server 130 may be  
2 provided by embedding it, as well as the operating event  
3 detector 10, the operating event analyzer 20 and the text  
4 extractor 30, as a script in the web contents 101, or together  
5 with the web contents 101, it may be distributed in the form of  
6 a Java applet to the information processing apparatus 110.

7 Since the thus obtained text can be regarded as information  
8 that the user has shown an interest in while browsing the web  
9 contents 101, the proxy server 130 can employ the text to  
10 provide various services, such as research performed to  
11 ascertain web audience rates and a reduction in the search  
12 conditions for a search engine.

13 As a modification of the mode in Fig. 11, the proxy server 130  
14 may not embed in the web contents 101 the script for carrying  
15 out the functions of the operating event analyzer 20 and the  
16 text extractor 30, and may permit the information processing  
17 apparatus 110 merely to detect an operating event. In this  
18 case, the operating event analyzer 20 and the text extractor 30  
19 are provided for the proxy server 130, and the operating event  
20 detected by the information processing apparatus 110 is  
21 transmitted to the proxy server 130. Then, the proxy server  
22 130 performs the process for analyzing the operating event  
23 string to detect a specific operation, such as the selection of  
24 a character string, the pointing to a link or the tracing and  
25 reading, and the process for extracting, for the pertinent  
26 operation, the target character string.

27 To transmit, to the proxy server 130, the operating event that  
28 is detected by the information processing apparatus 110, the  
29 script for transmitting the operating event may be embedded in

1 the web contents 101 before the proxy server 130 transmits them  
2 to the information processing apparatus 110, or a request for  
3 the transmission of an operating event may be issued by the  
4 proxy server 130 to the information processing apparatus 110 so  
5 that the information processing apparatus 110 transmits the  
6 operating event to the proxy server 130. Furthermore, the  
7 proxy server 130 may hold the web contents 101 received from  
8 the web server 100 and the text extractor 30 may extract the  
9 text from them, or the web contents 101 may be transmitted to  
10 the proxy server 130 by the information processing apparatus  
11 110.

12 In the mode shown in Fig. 12, a portal site 140, which the  
13 information processing apparatus 110 accesses first when it is  
14 connected to the Internet, transmits a program file 150 to the  
15 information processing apparatus 110. This program file 150  
16 implements a local proxy that writes the operating event  
17 detector 10, the operating event analyzer 20 and the text  
18 extractor 30 in the web contents 101 using a script language,  
19 such as JavaScript. In this mode, when the information  
20 processing apparatus 110 accesses the portal site 140, the  
21 program file 150 that is stored in a storage unit 141 at the  
22 portal site 140 is transmitted via a transmission/reception  
23 unit 142 to the information processing apparatus 110. The  
24 program file 150 is prepared, for example, as a Java applet.  
25 The program file 150 that is transmitted by the portal site 140  
26 to the information processing apparatus 110 serves as a local  
27 proxy 160 in the information processing apparatus 110. The  
28 local proxy 160 writes, in the web contents 101 received from  
29 the web server 100, a script for implementing the functions of  
30 the operating event detector 10, the operating event analyzer  
31 20 and the text extractor 30, and transmits the resultant web

1 contents 101 to the web browser 111.

2 Based on the script embedded in the web contents 101 that are  
3 received from the local proxy 160, the web browser 111 performs  
4 the process for detecting an operating event, the process for  
5 analyzing the operating event string to detect a specific  
6 operation, such as the selection of a character string, the  
7 pointing to a link or the tracing and reading, and the process  
8 for extracting, for the pertinent operation a target character  
9 string that thereafter is transmitted to the portal site 140.  
10 The function for transmitting the extracted text to the proxy  
11 server 130 may be provided by embedding it, as well as the  
12 operating event detector 10, the operating event analyzer 20  
13 and the text extractor 30, as a script in the web contents 101,  
14 or it may be provided as a function of the local proxy 160. Or  
15 else, the transmission/reception unit 142 of the portal site  
16 140 may issue a request, to the information processing  
17 apparatus 110, for the transmission of the extracted text,  
18 which it thereafter collects.

19 Since the thus obtained text can be regarded as information  
20 that the user has shown an interest in while browsing the web  
21 contents 101, the portal site 140 can employ the text to  
22 provide various services, such as research performed to  
23 ascertain web audience rates and a reduction in the search  
24 conditions for a search engine.

25 Fig. 13 is a diagram showing a comparison of the embodiment  
26 with the prior art in the process for employing obtained text  
27 to generate a keyword vector (a selected keyword and the  
28 weighting that represents its importance level) for a search  
29 engine. Using the conventional method, keywords included in

1 the overall page are weighted using, for example, the TF-IDF  
2 method, and an important keyword is extracted. In this  
3 embodiment, however, the keyword weighting process is performed  
4 for the text that is a target for a user's operation. For the  
5 weighting of keywords, a conventional method, such as the IDF  
6 method in the TF-IDF method, can be employed. While the keyword  
7 vector that is generated based on the text obtained in this  
8 embodiment can be employed by itself for services, such as  
9 research performed to ascertain web audience rates and a  
10 reduction in the search conditions for a search engine.  
11 Further, as is shown in Fig. 13, the keyword vector can also be  
12 employed with a keyword vector that is conventionally  
13 generated.

14 In the four modes, the transmission destination of the  
15 extracted text is not limited to those described above, and the  
16 extracted text can be transmitted to various users who are  
17 permitted to use it. For example, in the mode in Fig. 9, the  
18 extracted text may be transmitted to the creator of the web  
19 contents 101 in which the script 102 is embedded. Furthermore,  
20 in the modes in Figs. 11 and 12, the extracted text may be  
21 transmitted to a server that is provided separate from the  
22 proxy server 130 or the portal site 140, and that uses the  
23 extracted text to provide a service.

24 In this embodiment, text is extracted from web contents based  
25 on a user's operation. However, text may be extracted from  
26 document data having another arbitrary form. In this case, an  
27 area for monitoring the movement of a mouse may be set up not  
28 only on a screen whereon web contents are displayed by a web  
29 browser, but also various other areas, such as the entire



1 screen of a display device for of a computer or an area in a  
2 window that is displayed by an application program.

3 In addition, based on a user's operation performed for an  
4 object, such as an image other than text, the information for  
5 the target object can be extracted. In this case, the  
6 operation that is defined as one the user unintentionally  
7 performs for an interesting object is the selection of an  
8 object, which is performed in the same manner as is the  
9 selection of text, the pointing to a line, or clicking.

10 Moreover, input means other than the mouse or another pointing  
11 device may be employed to define the operation that a user  
12 unintentionally performs for an interesting object. A specific  
13 operation can be defined in accordance with, for example, the  
14 manipulation of a cursor key, voice input when the user reads  
15 text on a display, or the movement of a user's eyes.

#### 16 Advantages of the Invention

17 As is described above, according to the present invention,  
18 while informative input by a user is not required, detailed  
19 information concerning a web content portion that the user is  
20 interested in can be obtained. Further, a detailed record of a  
21 user's operation, including a the manipulation of objects on a  
22 web browser display, can be extracted, and can be used as  
23 information indicating the trend of the user's interest.

24 The present invention can be realized in hardware, software, or a  
25 combination of hardware and software. The present invention can  
26 be realized in a centralized fashion in one computer system, or  
27 in a distributed fashion where different elements are spread

1 across several interconnected computer systems. Any kind of  
2 computer system - or other apparatus adapted for carrying out the  
3 methods described herein - is suitable. A typical combination of  
4 hardware and software could be a general purpose computer system  
5 with a computer program that, when being loaded and executed,  
6 controls the computer system such that it carries out the methods  
7 described herein. The present invention can also be embedded in a  
8 computer program product, which comprises all the features  
9 enabling the implementation of the methods described herein, and  
10 which - when loaded in a computer system - is able to carry out  
11 these methods.

12 Computer program means or computer program in the present context  
13 mean any expression, in any language, code or notation, of a set  
14 of instructions intended to cause a system having an information  
15 processing capability to perform a particular function either  
16 directly or after conversion to another language, code or  
17 notation and/or reproduction in a different material form.

18 It is noted that the foregoing has outlined some of the more  
19 pertinent objects and embodiments of the present invention.  
20 This invention may be used for many applications. Thus,  
21 although the description is made for particular arrangements and  
22 methods, the intent and concept of the invention is suitable and  
23 applicable to other arrangements and applications. It will be  
24 clear to those skilled in the art that other modifications to  
25 the disclosed embodiments can be effected without departing from  
26 the spirit and scope of the invention. The described  
27 embodiments ought to be construed to be merely illustrative of  
28 some of the more prominent features and applications of the  
29 invention. Other beneficial results can be realized by applying  
30 the disclosed invention in a different manner or modifying the

